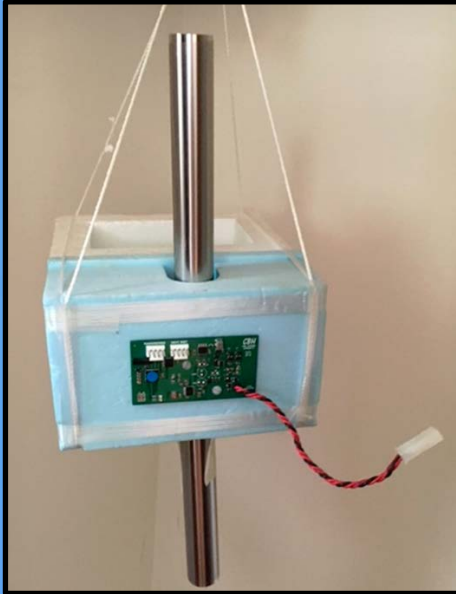


Cryogenic Balloon Hygrometer CBH



AIR Labs, LLC
Boulder, CO

Steffie Goodman

About AIR Labs

- Small scientific instrument manufacturing company in Boulder, CO
- Mission/Goals
 - To contribute to the global monitoring of gases and particulates in the atmosphere
 - To manufacture high quality balloon borne instruments for the atmospheric research community to be sold at a fair price

CBH: Specifications

- Measures frost point/ dew point temperature (°C) troposphere/lower stratosphere up to 25-28 km
- Weight: 410 grams (without cryogen)
- Dimensions: 30cm x 17cm x 12cm without inlet tubes
 - Inlet tubes: 17cm
- Dewar capacity: 350 cc
 - Cryogen: Trifluoromethane R23 Freon
- Power: 9V, 3.0 Amp hour capacity
- Mirror temperature resolution: 0.01 °C

CBH and other Hygrometers

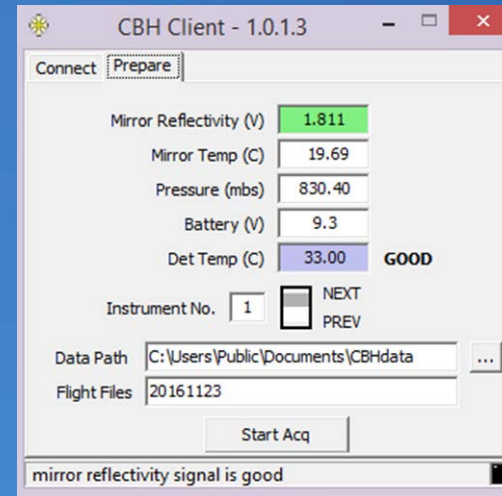
- Similarities between CBH, FPH, and CFH
 - All are based on the chilled-mirror principle
 - Differences between CBH, FPH, and CFH
 - Electronics with unique frost control algorithms
 - Insulation
 - Unique thermistor curve fit (CBH uses 10 points)
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- FPH—NOAA/ESRL/GMD Frost Point Hygrometer
 - CFH—En-SCI Cryogenic Frost Point Hygrometer

CBH: What's Included

- Sonde with inlet tubes and glue
- Battery pack with batteries
- User instruction manual
- One year warranty
- Online tech support
- CBH Client software
- Price \$1650 USD, shipping not included
- Recommend separate power supply for CBH and iMET (not included)
 - To be used during preflight preparation to save battery power for flight
 - \$25 USD each

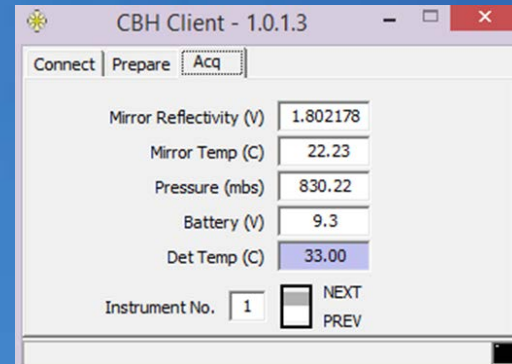
CBH Client Software

- Unique to CBH
- Easy to install and use
- Collects one Hz data
- Designed to work with the InterMet Systems iMet-1-RSB radiosonde
- Has been tested on
 - Windows XP, 7, 8.1 running Classic Shell
 - Yet to be tested on Windows 10
- Text file contains the following fields:
 - Date
 - Time
 - Instrument daisy chain number
 - Mirror reflectivity (V)
 - Mirror temperature (°C)
 - Pressure (mb)
 - Detector temperature (°C)
 - Battery (V)



CBH Client Software

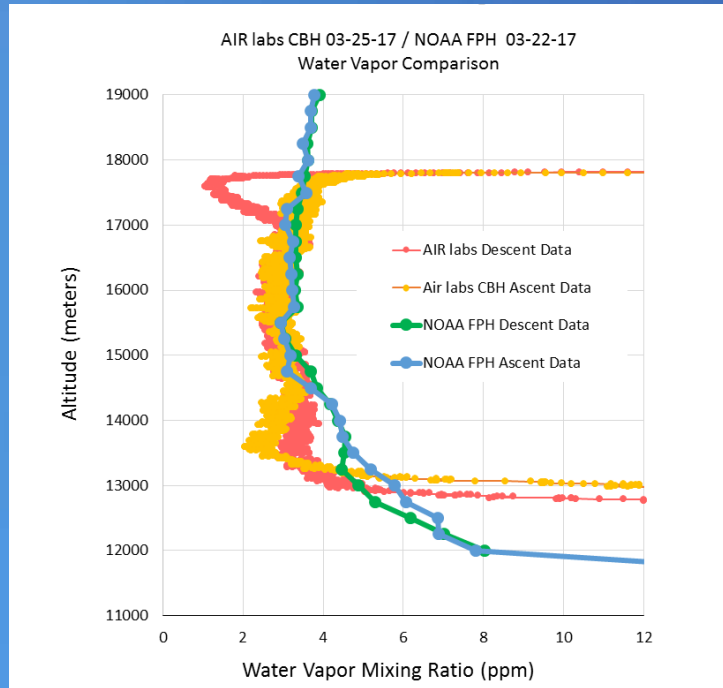
- CBH Client receives data from SkySonde Server
 - SkySonde Server available from NOAA
 - <https://www.esrl.noaa.gov/gmd/ozwv/wvap/sw.html>
 - Thanks NOAA!!
- CBH Client is used for both:
 - Preflight setup
 - Data collection
 - No separate software for setup
 - No additional dongles needed
 - No drivers needed



CBH: Preflight Preparation

- To be done 1 hour to 1 day prior to flight
 - Download software
 - Connect and power all instruments
 - Start CBH Client and prepare for flight per instructions < 10 minutes
- Immediately prior to flight
 - Glue inlet tubes
 - Attach battery pack and tape instrument for flight
 - Fill balloon
 - Begin Data Acquisition
 - Power on iMET/CBH
 - Add cryogen
- Launch

CBH/NOAA FPH Comparison 3/2017

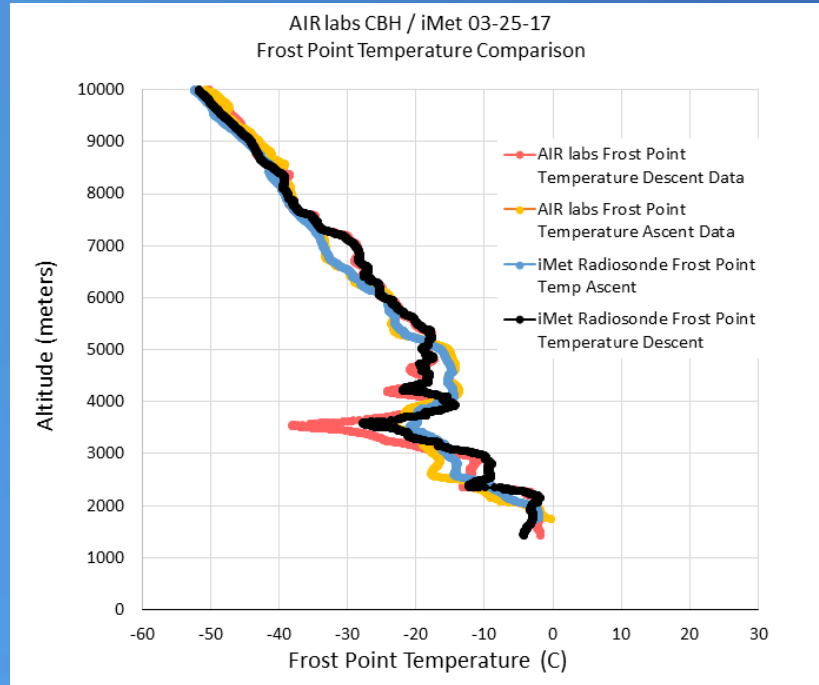


Note CBH flight topped out at 18 km due to faulty balloon

FPH Data: NOAA Earth System Research Laboratory, Global Monitoring Division:

ftp://aftp.cmdl.noaa.gov/data/ozwv/WaterVapor/Boulder_New/BLD_H2O_20170322.txt

CBH / iMET Frost Point Temperature Comparison Troposphere 3/25/17



Contact/Sales Information

- Airlabsscientific.com
- Six instruments currently available
- We hope we have answered some of your initial questions
- We will try to answer your future questions promptly

